

REMARKS

In an Office Action dated November 18, 2009, the Examiner rejected claims 6-9, 23-26, and 28-43 under 35 U.S.C. §102(e) as anticipated by Naik et al. (U.S. Patent Publication 20040205206).

Prior Art

While applicants believe the claims as previously presented sufficiently distinguish over the cited art, in the interests of furthering prosecution herein, applicants have made clarifying amendments to each of the independent claims. In particular, the qualifier “financial” has been applied to the “valuation” which is associated with work items or programs, consistent with the meaning as used in applicants’ specification. As amended, the claims are patentable over the cited art for the reasons stated herein.

As explained previously, applicants’ invention relates to the scheduling of computer resources in an environment where at least some of the resources are fee-based, i.e. there is a direct, financial cost associated with their use. The exemplary embodiment involves a fee-based distributed computing system (grid system), in which computing resource can be purchased on demand. The fees for purchasing resource could vary by time of day and/or day of week, or according to how busy the system is or other factors. In an exemplary embodiment, a local computer system or network, such as an in-house computer system within an enterprise, provides a limited amount of processing capability and is connected to the fee-based computing system for additional on-demand computing capacity. Other variations of this exemplary embodiment are possible.

Various conventional techniques exist for prioritizing tasks and allocating resources in a data processing environment. However, applicants observed that these techniques only

incompletely or inadequately support automated acquisition of on-demand fee-based resources, particularly where fees may vary, because they are unable to take account of the economic consequences of task deferral and schedule resources accordingly. For example, priority-based schemes generally assign a relative priority to each task, and schedule a pre-determined amount of available resources in such a manner as to allocate those resources preferentially to higher priority tasks. Such schemes may function well to allocate a fixed or otherwise determined amount of resource, but do not easily address the automatic obtaining of a variable amount of additional resource on demand based on economic justification.

Applicants provide a system in which both resource allocation and the amount of work done are variable according to relative economic cost. In accordance with applicants' system, a respective financial valuation is assigned to each of multiple data processing tasks ("work items", "programs", etc.) to be performed by a computer system or collection of computer systems, the financial valuation being specific to each task. This value is intended to represent some theoretical corresponding financial value associated with having the task done now as opposed to later. These financial values are compared to the cost of obtaining resources necessary to complete the task now, e.g., the fee charged for accessing an external computing grid to perform the work. If the cost exceeds the value, the task is deferred; if not, the resource is obtained to perform the task now, and the resultant cost is incurred. In the exemplary embodiment, the highest valued tasks are first assigned to the in-house system, and to the extent there are tasks left over, a determination is made whether to purchase external on-demand computing resources on a task-by-task basis, it being possible that all, some or none of the tasks will justify the purchase of additional computing resource. By deferring less "valuable" jobs, greater flexibility is achieved to process these jobs at a time when the fees are lower, or when in-house computing resources are idle so that no fee is required.

Therefore, significant features of applicants' invention are that *a respective financial valuation* is associated with each of a plurality of tasks to be performed by a computer system ("work items", "programs", etc.), that this *financial valuation is compared to a respective cost* of the computing resources required to do the work, and that the scheduler *selectively accesses the resources or defers processing* based on this comparison. Applicants' representative claim 6, as amended, recites:

6. A computer-implemented method for managing access to computer resources, the method comprising:

(a) *defining a respective financial valuation of each of a plurality of work items* to be processed by one or more data processing systems;

(b) *comparing the respective financial valuation of each respective said work item to a respective cost of accessing additional computer resources* necessary to process the work item in a current time period, said additional computer resources being external to said one or more data processing systems;

(c) with respect to each said work item for which the *respective financial valuation of the work item exceeds the respective cost* of accessing additional computer resources necessary to process the work item in the current time period, dynamically accessing additional computer resources necessary to process the work item in the current time period;

(d) with respect to each said work item for which the *respective financial valuation of the work item does not exceed the respective cost* of accessing additional computer resources necessary to process the work item in the current time period, deferring processing of the work item to a subsequent time period; and

(e) repeating said (b) through (d) in one or more subsequent time periods with respect to each said work item deferred by said (d) until each said work item has been processed. [emphasis added]

The remaining independent claims vary in scope, but all contain limitations analogous to the italicized limitations above¹.

¹ Independent claim 23 does not recite "additional computer resources", but recites a method of providing fee-based processing, in which the financial valuation is compared with the projected fee for utilization of computer resources. Various other differences exist, but all claims recite associating financial valuations with work items or tasks, and making comparisons and accessing resources based on the financial valuations.

Naik discloses a resource management system for managing data storage bandwidth on behalf of multiple applications. The resource management system is a middle layer application providing an interface for applications to utilize storage resources. Applications or application managers communicate expected future storage requirements, priorities and so forth, to the resource management system. In particular, the applications can define different types of tasks (backup, recovery, etc.), task priorities, expected task frequency, expected time to completion, time constraints, range of data, resources needed, etc. to the resource manager. The resource management system allocates the available storage bandwidth among multiple applications accordingly.

The Examiner apparently reads *Naik*'s task priority as a "respective valuation" assigned to each task. The Examiner further reads *Naik*'s determination of resources needed to meet the requirements of a task during a task "registration" process as satisfying applicants' recited step (b) of comparing valuation to cost. The Examiner further reads *Naik*'s ability to change the schedule of resources to accommodate a (higher priority) unscheduled recovery task as satisfying steps (c) and (d) of claim 6.

As explained previously, "valuation" is not an arbitrary execution or allocation priority, but an economic measure which permits a cost of a service to complete a task to be compared with the value of having a task done now rather than later. While applicants believe the claims as previously presented were sufficiently clear on this point, in the interests of furthering prosecution herein, all independent claims have been amended to recite a "financial valuation" of a work item or program. This "financial valuation" is compared with a "cost" or "fee" for obtaining the resources to complete a task. Thus, the claims require a comparison of economic or financial measures for purposes of determining whether a proposed expenditure for the acquisition of computing resources is justified.

Naik discloses none of these things. An execution or allocation priority of a task is not a “financial valuation” and can not be equated with or mapped to a financial cost; it is nothing more than an expression of relative preference for available resources among multiple tasks. Nor are any of the other parameters mentioned in *Naik* (task frequency, time to complete, range of data, resources needed) a measure of “financial valuation”. Nor does *Naik* disclose that resources are acquired at a cost or fee from a grid or otherwise, for which there is a specific cost or fee associated with the resources. *Naik*’s resources are those available on a system or network, and when *Naik* refers to obtaining resources, they refer to allocating resources to a specific task from the general pool of available resources, without any associated cost or fee.

The association of a “financial valuation” with work items or programs is central to applicants’ invention, and all the other claim limitations must be read in light of this association. It is impossible to meaningfully compare arbitrary execution or allocation priorities or other parameters mentioned in *Naik* to the cost or fee for obtaining resources. Such a comparison, if made, would not enable one to draw any conclusion with respect to whether a proposed expenditure for resource is justified. The priority may be high; the priority may be low. But in neither case can one determine whether, for a given cost of obtaining the required resource, obtaining the resource is economically justified.

Fundamentally, *Naik* fails to disclose associating any form of ***financial valuation*** with tasks to be performed by the computer system. For all of the above reasons, various essential claim limitations are not disclosed in *Naik*, and the claims are not anticipated by *Naik*.

Nor are the claims obvious over *Naik*. As explained above, applicants’ invention relates to making automated decisions about computer resource acquisition based on financial consequences of those decisions. There is nothing in *Naik* which teaches, suggests, or otherwise offers a rationale for considering the financial consequences of resource acquisition decisions, and

specifically for associating a respective financial valuation with each of a plurality of work items or programs. A priority mechanism is only designed to resolve conflicting claims upon a resource by multiple tasks; it says nothing whatsoever about the financial valuation of the task to be performed or the financial cost of obtaining the resource.

In view of the foregoing, applicants submit that the claims are now in condition for allowance and respectfully request reconsideration and allowance of all claims. In addition, the Examiner is encouraged to contact applicants' attorney by telephone if there are outstanding issues left to be resolved to place this case in condition for allowance.

Respectfully submitted,

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